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None

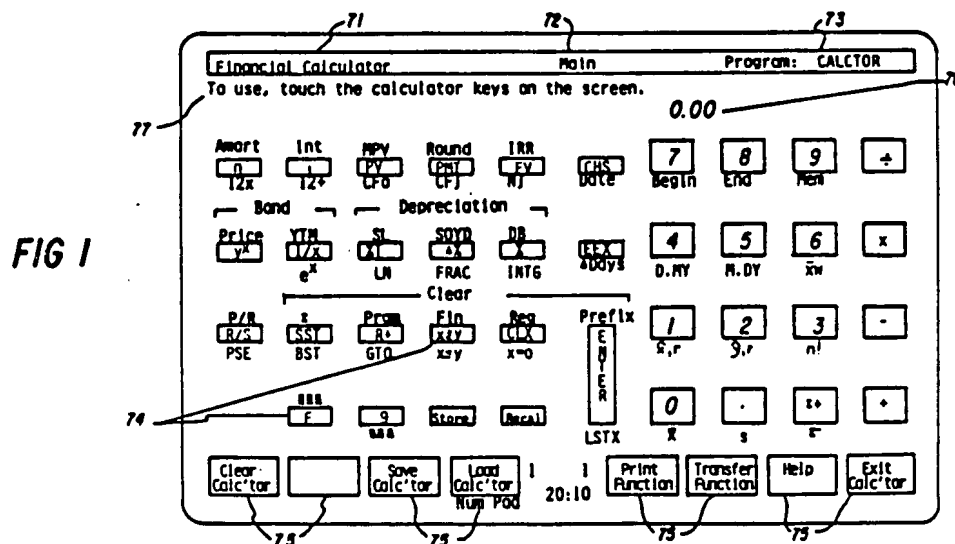
(58) Field of search
G4A

G06F3/023A2

(54) Computing apparatus with a touchscreen operator interface

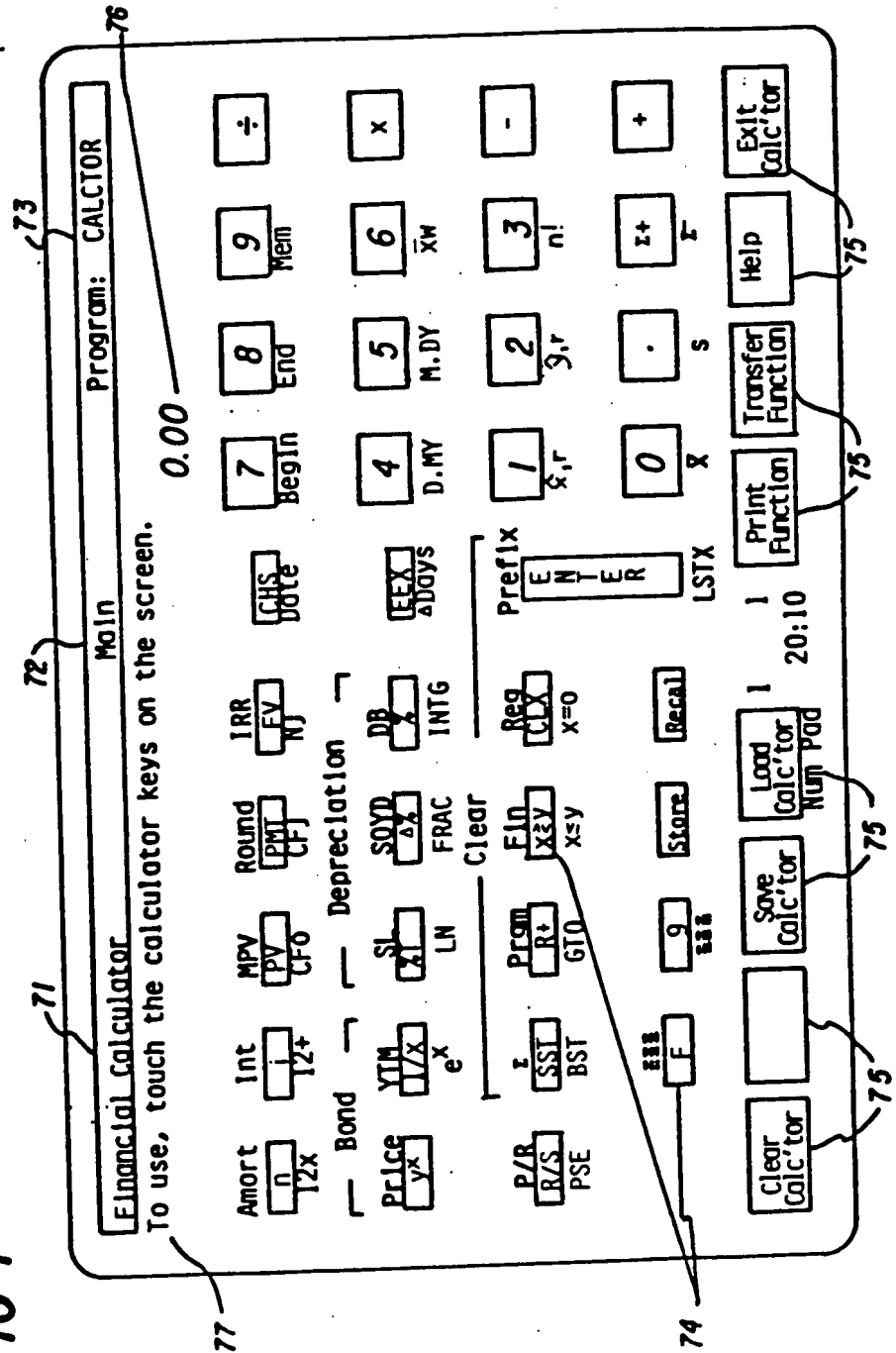
(57) Computing apparatus with a touchscreen operator interface is arranged to emulate, in function and appearance, a predetermined, three-dimensional, data-processing instrument such as a calculator. To this end, a two-dimensional image of the calculator is displayed on a video screen of the apparatus. A touchscreen device associated with the video screen is arranged to detect the touching of the screen in areas 74 corresponding to operating controls of the two-dimensional calculator image. Whenever the touching of an operating-control image is detected, the apparatus carries out an instruction sequence corresponding to that which the calculator would have undertaken if the control had been operated in reality. The result of the instruction sequence is displayed 76 on the video screen.

DOC Additional areas on the touchscreen provide aids for the user e.g. Help 75 when touched causes display of operating information. A prompt line display 77 appraises the user of the options available.



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FIG 1



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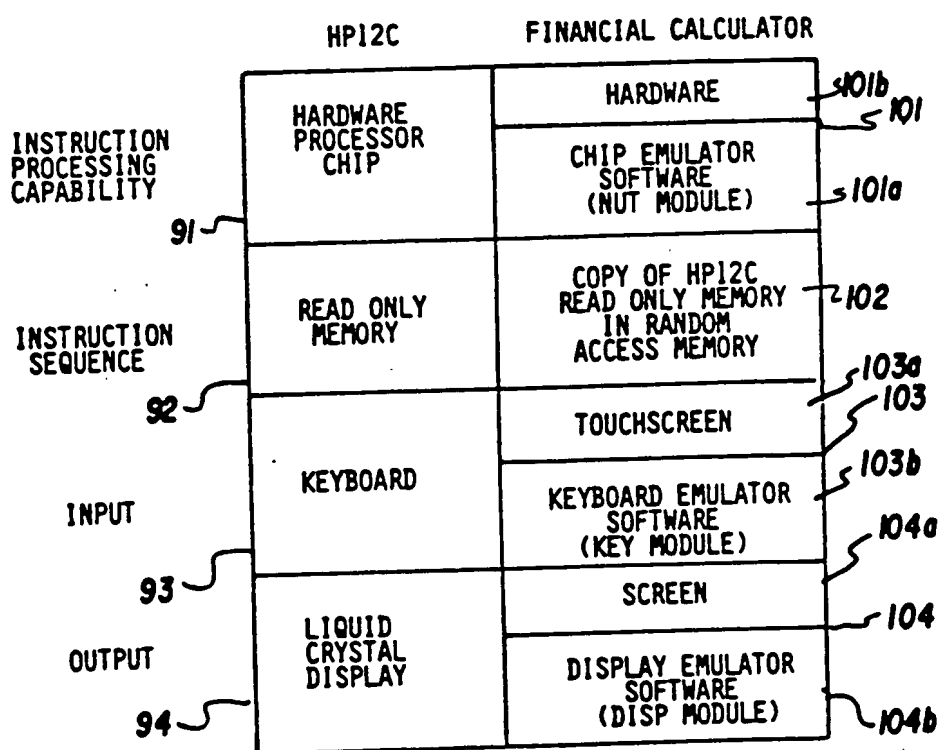


FIG 2

SPECIFICATION

Computing apparatus with a touchscreen operator interface

5 The present invention relates to computing apparatus with a touchscreen operator interface.

The increasing proliferation and utility of
10 computers and computing devices and the spread of their use by persons with non-technical backgrounds require the design of "userfriendly" computer interfaces. One recent improvement in computer interfaces has
15 been in the area of "touchscreen" data input (see our copending UK Patent Application No. 8503935 entitled "Touchscreen Apparatus"). The present invention relates to the use of touchscreen technology to make further im-
20 provements in computer/human interfaces.

According to the present invention, there is provided computing apparatus with a touchscreen operator interface, said apparatus being arranged to emulate, in function and appearance, a predetermined, three-dimensional,
25 data-processing instrument, the apparatus comprising a computer with a video screen; emulation control means coupled to the computer and comprising visual emulator means
30 for providing a two-dimensional reproduction of at least the operating control area of the instrument on the computer video screen, processor emulator means for emulating a processor of the instrument, and instruction
35 sequencing means coupled to the processor emulator means for storing instruction sequences to be performed by the processor emulator means, said instruction sequences corresponding to those performed by the in-
40 strument processor; and touchscreen means coupled to the computer for allowing an operator to interact with the emulation control means by touching the two-dimensional repro-
45 duction in areas thereof corresponding to operating controls of the instrument being emulated, the emulation control means being responsive to an operator touching an emulated operator control to execute a corresponding
50 one of said instruction sequences and, where appropriate, to output data.

The emulated instrument is, for example, a calculator.

The instruction sequences to be performed by the processor emulator means may corre-
55 spond exactly to those performed by the emulated processor or simply correspond in terms of executing similar functions. Furthermore, the processor emulator means may be arranged to emulate a specific processor chip.
60 In computing apparatus as set forth in any one of the last three preceding paragraphs, the visual emulator means is arranged to provide a two-dimensional reproduction of the display of said instrument on the computer
65 video screen, the said data output being dis-

played in the area thereof corresponding to the emulated instrument display.

There now follows a detailed description which is to be read with reference to the
70 accompanying drawings of computing apparatus for emulating an instrument; in the present example, the computing apparatus is an HP150 personal computer and the emulated instrument is a handheld calculator, in particu-
75 lar, an HP12C Financial Calculator, both the computer and calculator being manufactured by Hewlett-Packard Company of Palo Alto, California, USA. It is, however, to be under-
80 stood that the computing apparatus and instrument have been selected for description to illustrate the invention by way of example and not by way of limitation.

In the accompanying drawings:

Figure 1 is a display on a computer touch-
85 screen of an emulated HP12C Financial Calculator; and

Figure 2 shows programming emulator modules for a program which implements the
90 emulated HP12C Financial Calculator of Figure 1.

Figure 1 shows output from a program called "Financial Calculator" (FC), as it ap-
95 pears on an HP150 personal computer touchscreen display. FC emulates an HP12C hand-held calculator. Shaded regions called "keys", for example keys 74, correspond to the physical keys on an HP12C calculator. A "display" 76 corresponds to a physical display on an HP12C.
100 The emulated calculator shown in Figure 1 functions just like an actual HP12C. Numbers are entered into the emulated calculator by touching the keys numbered 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. Operations on entered num-
105 bers are performed by touching function keys, such as keys 74, or sequences of function keys. The emulated calculator performs calculations exactly like the HP12C handheld calculator.

In addition to areas on the touchscreen which directly correspond to parts of an
110 HP12C handheld calculator, there are additional areas on the touchscreen which offer aids to the operator. For instance, title area 71 tells the operator that he is running Finan-
115 cial Calculator (FC). A label area 72 indicates to the operator that he is in a module of FC called "Main". Another label area 73 indicates the program file being accessed is called
120 "Calctnr".

Additionally, a series of programmable soft-
keys 75 allow the operator to issue instructions merely by touching softkeys 75. For instance, an operator could exit (by depress-
125 ing the softkey labelled "Exit") the FC program or ask for information on how the calculator operates (by depressing the softkey labelled "Help") by merely touching the various labelled softkeys 75.

A prompt line 77 prompts the operator as

- the emulation control means includes:
chip emulator means for emulating a processor within the object; and
instruction sequencing means coupled to
- 5 the chip emulator means for storing instruction sequences to be performed by the chip emulator means, said instruction sequences corresponding exactly or being substantially similar to the instruction sequences performed
- 10 by the processor of the object.
9. Computing apparatus with a touchscreen operator interface, said apparatus being substantially as hereinbefore described with reference to the accompanying drawings.

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